OpenBMC
Open Software Framework for Next-Generation System Management

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Agenda

• Introduction
• History
• Current Status
• Facebook OCP 2018
• The Linux Foundation
• What’s Next?
What is a BMC?

• **BMC – baseboard Management Controller**
  
  • Run at AC plug time
  
  • Provides simplified management of:
    • Environment
    • Inventory
    • Sensors and even logs
    • Ex. Processors, DIMMs, Fans, Power Supplies, etc.
  
  • Reports externally to management software
What is Open BMC?

- OpenBMC is an open software framework to build a complete Linux image for a Board Management Controller (BMC).

- OpenBMC/OpenBMC vs. Facebook/OpenBMC
Open BMC History

• Started in Facebook in 2014 Jun
• Developed for Facebook ToR, Wedge
• OpenBMC for IBM Power
• Leverage Yocto Environment
• Open sourced through github
• Founding organizations of the OpenBMC project are Microsoft, Intel, IBM, Google, and Facebook.
Goals with OpenBMC

• Product Development Cycle
  • Faster Response
  • Reuse (ODMs, Customers)
  • Flexibility (Compute, Storage, Network)
  • Hardware Vendor Participation
  • Manageability Commoditization
  • Common Interfaces
    • Discovery, Updates, Sensor and FRU Configuration
OpenBMC Development Model

Traditional

OpenBMC

3rd Party HW Vendor
(AIC/PS/NVMe)

3rd Party BMC FW Vendor
(Aspeed/Nuvoton)

3rd Party BMC FW Vendor

BMC FW Source Code

3rd Party BMC FW Vendor

3rd Party HW Vendor
(AIC/PS/NVMe)

3rd Party BMC HW Vendor
(Aspeed/Nuvoton)

OpenBMC Project

ODM Server Vendor

BMC FW Source Code

# OpenBMC vs. 3rd Party BMC

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<th>OpenBMC</th>
<th>3rd Party BMC</th>
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<tr>
<td><strong>Source Code</strong></td>
<td>• Open Source @ Github</td>
<td>• Proprietary, Closed</td>
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<tr>
<td><strong>User Interface</strong></td>
<td>• SSH to BMC Linux Shell</td>
<td>• ipmitool - Raw Bytes</td>
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<td></td>
<td>• REST API - JSON objects</td>
<td></td>
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<td><strong>Security</strong></td>
<td>• Secure Shell (ssh)</td>
<td>• RMCP+ over UDP</td>
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<td></td>
<td>• http(s)</td>
<td>• Known vulnerabilities</td>
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<tr>
<td><strong>Authentication/Authorization</strong></td>
<td>• Centralized certificate based</td>
<td>• BMC-centric username/password database</td>
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<tr>
<td><strong>Multi-Node Management</strong></td>
<td>• Supported Natively with node/slot number</td>
<td>• Need to virtualize BMC with multiple IP addresses</td>
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OpenBMC System Management

• SSH Based UI

• Utility Based
  • Chassis control, Event and Sensor views, Firmware Updates, System configuration.

• IPMI
  • Sending raw IPMI commands and receiving responses.

• REST API
  • OpenBMC provides REST API as another UI for user to interact with the system.
OpenBMC Security

• Verified Boot
  • HW Support
  • Two SPI Flash Boot Devices
    • 1 Read-Only using WP (Write Protect)
  • TPM for BMC
    • Glue logic to reset BMC+TPM
  • Key hierarchy to allow online signing and key rotation
  • Verify FIT (Flattened Image Tree)
    • Blob Kernel + RootFS
• Verified Boot Status
  • Allow audit and take corrective action
OpenBMC Now

• Product Ready

• In production by multiple companies
  • Deployed within multiple datacenters throughout the world

• Passed an outrageous amount of manual and automated tests
  • Manufacturing, Functional Test, System Test

• Yocto/Bitbake based so continuous kernel and security updates available
OpenBMC Facebook Last OCP Summit

- Python2->Python3 Migration
- Yocto: Krogoth(2.1)->Rocko(2.4)
- Verified Boot

- OCP LCD Debug Card
  - LCD
  - System Information
  - POST Code
  - GPIO Status
  - SEL
  - Critical Sensors
  - Power Control

- At-Scale Debug
  - Remote debug on Intel server designs
OpenBMC The Linux Foundation

- OpenBMC is now a Linux Foundation project
- Selected as a respected and neutral steward of the project for all involved
  - [https://www.linuxfoundation.org/projects/](https://www.linuxfoundation.org/projects/)
- Owns any project trademarks
- DNS registrant for project domains
  - [https://www.openbmc.org/](https://www.openbmc.org/)
- Github organization owner
  - [https://github.com/openbmc/openbmc](https://github.com/openbmc/openbmc)
OpenBMC Goals

• The OpenBMC project's aim is to create a highly extensible framework for BMC software and implement for data-center computer systems.

• A few high-level objectives:
  • Provide a REST API for external management, and allow for "pluggable" interfaces for other types of management interactions.
  • Compatible with host firmware implementations for basic IPMI communication between host and BMC.
OpenBMC Technical Steering Committee

• Member
  • IBM
  • Facebook
  • Microsoft
  • Intel
  • Google

• Community contributions drive project direction

• Working to further define the role

• Working to identify new member criteria
OpenBMC Next – System Management

• **IPMI**
  - IPMI 2.0 Compliance and Full DCMI support

• **REST**
  - All D-Bus interfaces defined in phosphor-dbus-interfaces repo in GitHub
  - All REST APIs have a direct mapping to all defined D-Bus interfaces

• **Web Interface**
  - Chassis control, Event and Sensor views, Firmware Updates, Server configuration

• **Event Notification**
  - Create dynamic web sockets to get call backs on critical events

• **Redfish**
Reference

- https://www.openbmc.org/
Best TCO and Workload Optimized IT Solutions for Data Centers